

wherein the metal contacts and interconnects are formed by annealing the memory at a temperature sufficient to drive alloy dopants into solid solution and quenching the memory prior to polishing the memory device to remove portions of a metal layer and form the metal contacts and interconnects.

REMARKS

Claims 18 and 20 are amended; as a result, claims 18-44 remain pending in this application.

§103 Rejection of the Claims

Claims 18-25 and 27-44 were rejected under 35 USC § 103(a) as being unpatentable over Dubin et al. (U.S. 6,271,591 B1) or over Besser et al. (U.S. 6,110,829), or over Chen et al. (U.S. 6,139,697) in view of the admitted prior art. Claim 26 was rejected under 35 USC § 103(a) as being unpatentable over Chen et al. as applied to claim 20 above.

Under the patent laws, in order to combine references to form an obvious rejection, all the elements in the claimed invention must be found in the cited references.

The content of the cited references was summarized in the Office Action of September 5, 2002. As stated therein, Dubin et al. discloses metal contacts in which an alloy dopant has been driven into solid solution and the interconnect has been mechanically polished. Further, Besser et al. discloses metal contacts in which an alloy dopant has been driven into solid solution, and then the interconnects being chemically mechanically polished. Additionally, Chen et al. discloses metal contacts in which an alloy dopant has been driven into solid solution and the interconnect chemically mechanically polished.

Of the above-cited references, only Dubin et al. and Besser et al. disclose annealing the alloy after the alloy deposited but prior to chemical-mechanical polishing. However, neither of these references disclose quenching the alloy. In addition, none of the above references disclose performing a second anneal after the chemical-mechanical polishing.

An embodiment of Applicant's invention includes an anneal and quenching the memory prior to chemical-mechanical polishing to prevent alloy dopants from coming out of solution

(Specification, page 8, lines 5-7). Further, an embodiment of Applicant's invention includes performing a second anneal after chemical-mechanical polishing to allow the dopants to come out of solution, thereby increasing the conductivity of the metal alloy (Specification, page 8, lines 8-10).

Independent claims 18 and 20 have been amended to include the limitation that the memory is quenched prior to chemical mechanical polishing. Independent claim 25 already includes this limitation. In addition, independent claims 29, 34 and 36 already include the limitation that the memory is either "doubly annealed" or "twice annealed." Further, independent claims 31 and 40 respectively include "high-conductivity means... for" and "annealed alloy means ...for" language. Such claim language is understood to include the quenching and double-annealing techniques as described in the specification on page 7, line 18 through page 8, line 10.

In sum, all of claims 18-44 as now presented include the quenching limitation and/or the double-anneal limitation. Because neither of these limitations are found in any of the cited references, Applicant respectfully submits claims 18-44 cannot be properly rejected for obviousness in view of the cited or "admitted" prior art. Applicant therefore respectfully requests withdrawal of the obvious rejection of claims 18-44 and allowance of these claims.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney, Joseph Gortych at 802-660-7199, to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

PAUL A. FARRAR ET AL.


By their Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9587

Date

5 Dec 2002

By


Timothy B. Elise
Reg. No. 40,957

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, Washington, D.C. 20231, on this 5th day of December, 2002.

Name

Amy Moriarty

Signature

Amy Moriarty